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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,109	03/10/2004	Joseph F. Brooks	M4065.1019/P1019	2463
24998	7590	12/01/2005	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP			SARKAR, ASOK K	
2101 L Street, NW			ART UNIT	
Washington, DC 20037			PAPER NUMBER	
			2891	

DATE MAILED: 12/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No.	Applicant(s)	
	10/796,109	BROOKS, JOSEPH F.	
	Examiner	Art Unit	
	Asok K. Sarkar	2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>6/28/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2, 9, 15, 16, 17, 24 and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by Kozicki, US 2003/0137869.

Regarding claims 1, 2, 9, 16, 17 and 24, Kozicki teaches a method of fabricating chalcogenide containing resistance variable memory elements, the method comprising:

- forming a first electrode 3010 over a substrate;
- forming a stack of one or more layers over the first electrode, the stack comprising at least one layer of chalcogenide glass 3040 and at least one silver metal containing layer 3020;
- forming a protective layer of W, 3030 over the stack, the protective layer blocking light, being conductive, and being etchable when etching the stack, the metal Ag of the metal containing layer being substantially insoluble in the protective layer;
- patterning the stack and the protective layer; and etching the stack and the protective layer are inherent in the description with reference to Fig. 30 in paragraphs 43, 44 and 128 .

Regarding claims 15 and 29, Kozicki teaches the metal containing layer and the chalcogenide layer are same layer made of chalcogenide materials in paragraphs 44 and 79.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 3 – 8 and 28 – 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kozicki, US 2003/0137869 in view of Wolf and Tauber, "Silicon Processing for the VLSI Era", Volume I, Chapters 12 and 15, Lattice Press, 1986.

Regarding these claims, Kozicki fails to teach patterning the stack by photoresist, developing the resist and various etching and rework after the etching.

Wolf and Tauber teach the technique of photoresist patterning, developing, etching and rework in order to clearly define the etched patterns as a standard processing technology for semiconductor industry.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Kozicki and pattern, develop, etch and rework the lithography in order to achieve a clearly defined etched pattern of the stacked film by the various methods available in the industry as described by Wolf and Tauber in chapters 12 and 15.

6. Claims 11, 12 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kozicki, US 2003/0137869.

Regarding these claims, Kozicki fails to teach the thickness of the protective layer.

However, it would have been obvious to one with ordinary skill in the art at the time of the invention to judiciously adjust and control the thickness of the layer through routine experimentation and optimization to achieve optimum benefits (see MPEP 2144.05) and it would not yield any unexpected results.

Note that the specification contains no disclosure of either the critical nature of the claimed processes or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen methods or upon another variable recited in a claim, the Applicant must show that the chosen methods or variables are critical (*Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir., 1990)). See also *In re Aller, Lacey and Hall* (10 USPQ 233 – 237).

7. Claims 10, 25 and 30 – 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kozicki, US 2003/0137869 in view of Nejad, US 2005/0162883.

The applied reference has a common *assignee* with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

Regarding claims 10 and 25, Kozicki fails to teach forming the protective layer comprises forming a composite layer of tungsten/tantalum nitride.

Nejad teaches that tungsten/tantalum nitride can be used for the electrode in paragraph 54 for the benefit of forming a PCRAM device in paragraph 2.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Kozicki and form the protective layer comprising forming a composite layer of tungsten/tantalum nitride for the benefit of forming a PCRAM device as taught by Nejad in paragraph 2.

Regarding claims 30 – 34 and 37 – 45, Kozicki teaches the formation of the first electrode, chalcogenide and metal containing layer in a stack, protecting layer of W that is light blocking material and in which silver is insoluble, forming photoresist layer, developing the photoresist layer, etching and removing the resist layer as described earlier in rejecting claims 1 – 29, but fails to teach forming the stack with layers of $\text{Ge}_x\text{Se}_{100-x}$ and Ag_2Se and Ag, the thickness of the $\text{Ge}_x\text{Se}_{100-x}$ layers, forming the second electrode on W that is common to plurality of memory elements.

Nejad teaches forming a first electrode over a substrate; forming a stack of layer by forming a first layer of $\text{Ge}_x\text{Se}_{100-x}$ over the first electrode; forming a first layer of Ag_2Se over the first layer of $\text{Ge}_x\text{Se}_{100-x}$; forming a second layer of $\text{Ge}_x\text{Se}_{100-x}$ over the first layer of Ag_2Se ; forming a layer of Ag over the second layer of $\text{Ge}_x\text{Se}_{100-x}$; forming a third layer of $\text{Ge}_x\text{Se}_{100-x}$ over the layer of Ag; forming a protective layer of W on the third layer of $\text{Ge}_x\text{Se}_{100-x}$; subsequently etching the stack and the protective layer to form a pillar structure; forming a second electrode on the protective layer, the second electrode being common to a plurality of memory elements with reference to Fig. 7 and Figs 2A – 2D in paragraphs 54 – 57 for the benefit of forming a memory read architecture in paragraph 11.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Kozicki and form the stack with layers of $\text{Ge}_x\text{Se}_{100-x}$ and Ag_2Se and Ag, the thickness of the $\text{Ge}_x\text{Se}_{100-x}$ layers, forming the second electrode on W that is common to plurality of memory elements as that taught by Nejad for the benefit of forming a memory read architecture in paragraph 11.

Regarding claim 35, the limitations have been described earlier in rejecting claims 11 and 26.

Regarding claim 36, Kozicki in view of Nejad fails to teach the thickness ratios of the As_2Se layer with respect to that of $\text{Ge}_x\text{Se}_{100-x}$ layer.

However, it would have been obvious to one with ordinary skill in the art at the time of the invention to judiciously adjust and control the thickness of the two layers through routine experimentation and optimization to achieve optimum benefits (see MPEP 2144.05) and it would not yield any unexpected results.

Note that the specification contains no disclosure of either the critical nature of the claimed processes or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen methods or upon another variable recited in a claim, the Applicant must show that the chosen methods or variables are critical (*Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir., 1990)). See also *In re Aller*, *Lacey and Hall* (10 USPQ 233 – 237).

8. Claims 13 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kozicki, US 2003/0137869 in view of Kozicki, US 5,314,772.

Kozicki fails to teach etching with halogen containing reactive ion etch.

Kozicki (772) teaches etching with halogen containing reactive ions for the benefit of transferring the smallest feature on the mask in column 5, lines 39 – 50.

Therefore, it would have been obvious to one with ordinary skill in the art at the

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time of the invention to modify Kozicki and etch with halogen containing reactive ion etch for the benefit of transferring the smallest feature on the mask as taught by Kozicki (772) in column 5, lines 39 – 50.

9. Claims 14 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kozicki, US 2003/0137869 in view of Brown, US 6,086,796.

Kozicki fails to teach etching with argon sputter etch process.

Brown teaches argon sputter etch process for the benefit of rapid and efficient etching in column 10, lines 48 – 64.

Therefore, it would have been obvious to one with ordinary skill in the art at the time of the invention to modify Kozicki and etch with argon sputter etch process for the benefit of rapid and efficient etching as taught by Brown in column 10, lines 48 – 64.

Conclusion

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asok K. Sarkar whose telephone number is 571 272 1970. The examiner can normally be reached on Monday - Friday (8 AM- 5 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William B. Baumeister can be reached on 571 272 1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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11. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Asok K. Sarkar
November 29, 2005

Primary Examiner